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Expectancies for and use of e-cigarettes and hookah among young adult non-daily smokers

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HIGHLIGHTS

- About one in three young adults reported past 2 week e-cigarette and/or hookah use.
- 37% of those who used either e-cigarettes or hookah reported using both.
- Expectancies were associated with greater odds of use of e-cigarettes and hookah.
- Expectancies were also associated with frequency of use of these products.

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ABSTRACT

Introduction: Understanding predictors of e-cigarette and hookah use among young adults is important in light of their increasing prevalence, particularly in younger populations. The purpose of this study was to test the hypothesis that young adult non-daily cigarette smokers' use of e-cigarettes and hookah would be positively associated with their expectancies about these products.
Methods: Young adults ($n = 377$, 58.0% male) aged 18–24 years ($M = 20.5$, $SD = 1.8$) who had been non-daily smokers for at least six months but had never been daily smokers completed a baseline assessment online or via mobile phone as part of a larger, longitudinal study.
Results: Approximately one in three participants reported any e-cigarette (34.0%) and/or hookah (33.4%) use in the past 14 days; 37% of those who used either product reported using both.
More positive e-cigarette expectancies were associated with higher odds of any e-cigarette use and with heavier use in the past two weeks. Similarly, more positive expectancies for hookah use predicted greater odds of any use as well as more frequent use of hookah (all $ps < 0.001$). Cigarette expectancies were correlated with ANTP expectancies, but did not account for the latter's association with ANTP use.
Conclusions: Findings suggest that expectancies play a role in determining whether young adult cigarette smokers also use these nicotine products. These data also suggest use of e-cigarettes and/or hookah may be as common as not among young adult nondaily smokers.

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1. Introduction

Young adult polytobacco use is a growing public health concern. Polytobacco use is the concurrent use of cigarettes and at least one alternative nicotine and tobacco product (ANTP). ANTPs include cigars and smokeless tobacco as well as newer products like electronic nicotine delivery systems (ENDS or "e-cigarettes") and hookah. ANTP use has doubled over the past 15 years, yet these products remain largely unregulated (Centers for Disease Control and Prevention, 2012), and for some (i.e., e-cigarettes and hookah) relatively little is known about short- or long-term consequences of use. ANTPs are marketed to young adults through advertisements and appealing flavor options (Alpert, Koh, & Connolly, 2008; Martinasek, McDermott, & Martini, 2011). Unsurprisingly, polytobacco use is most common among those aged 24 and under (Renaud, Nonemaker, Kim, & Busey, 2010). Nearly half of cigarette smokers in this age group also use ANTPs (Nasim, Blank, Cobb, & Eissenberg, 2012).

The increased prevalence of polytobacco use among young adults is troubling for several reasons. First, polytobacco use may heighten tobacco-associated health risks via increased exposure to carcinogens and other harmful constituents (Centers for Disease Control and Prevention, 2010; Chao et al., 2002; Ferrence & Stephens, 2000). Another concern is that greater nicotine exposure through polytobacco use will increase nicotine dependence and subsequently cigarette consumption.

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We recently reported that young adult cigarette smokers who had used hookah in the past month reported increased cigarette consumption six months later, whereas non-users of hookah reported no change (Doran, Godfrey, & Myers, 2015). Polytobacco use has also been associated with higher nicotine dependence, even among nondaily smokers (Timberlake, 2005, 2009), and greater difficulty quitting cigarettes (Thomas et al., 2015; Wetter et al., 2002). Overall, polytobacco use may increase nicotine intake, accelerating progression toward dependence and chronic, daily tobacco use. The effect of polytobacco use on cigarette progression may be particularly damaging to this age group given that young adulthood is a formative period for development of habits that impact long-term health (Chassin, Presson, Rose, & Sherman, 1996; Nelson Laska, Pasch, Lust, Story, & Ehlinger, 2009). These potential consequences highlight the need for improved understanding of polytobacco use among young adults.

The present study focused on predictors of use of the two ANTPs that are most prevalent among young adults: e-cigarettes and hookah. A few previous studies have examined e-cigarette and hookah use among young smokers. Use of these products has been associated with male sex, younger age, Caucasian ethnicity, and college enrollment (Doran & Trim, 2015; Lee, Bahreinifar, & Ling, 2014; Ramo, Young-Wolff, & Prochaska, 2015). Additionally, e-cigarette and hookah use have been associated with behavioral and temperamental factors including alcohol and drug consumption, cigarette frequency, and impulsivity (Doran & Trim, 2015; Doran et al., 2015; Sterling & Mermelstein, 2011).

To date there has been little research on cognitive factors that may predict ANTP use. Cognitive processes such as outcome expectancies have been consistently associated with use of multiple substances, including tobacco (Doran et al., 2013; Heinz, de Wit, Lilje, & Kassel, 2013). Expectancies are beliefs about the consequences of substance use that reflect experience with and observation about the consequences of specific behaviors (Bolles, 1972; Tolman, 1932). Given their recent increase in popularity, there is little research on ANTP expectancies. The lone study on the topic to our knowledge found an association between e-cigarette expectancies and use, such that positive expectancies predicted greater likelihood of past 30 day use (Pokhrel, Little, Fagan, Muranaka, & Herzog, 2014).

In contrast, there is an extensive literature on the role of cigarette expectancies in youth smoking. Cigarette expectancies are important predictors of use (Hine, Honan, Marks, & Brettschneider, 2007), as well as of dependence, initiation and progression (Doran et al., 2013; Myers, McCarthy, MacPherson, & Brown, 2003; Wetter et al., 2004). The two expectancy domains that have consistently predicted cigarette consumption are social facilitation (Myers et al., 2003; Schweizer, Doran, & Myers, 2014) and affect regulation (i.e., positive and negative reinforcement) (Brandon & Baker, 1991; Doran et al., 2013; Guller, Zapolski, & Smith, 2015). Because cigarettes and ANTPs each deliver nicotine, one might expect that the link between expectancies and use would be similar across products. However, expectancies are thought to develop based on observation in addition to direct experiences, and there are strong indications that observations about ANTPs differ from observations about cigarettes. In particular, youth and young adults perceive e-cigarettes and hookah as conferring less risk of health consequences, addiction, and social disapproval relative to cigarettes (Berg et al., 2015; Pepper & Brewer, 2014). Additionally, these groups are extensively exposed to pro-ANTP messages in social and other media (Hua, Yip, & Talbot, 2013; Pepper & Brewer, 2014). Previous studies have shown that pro-drug message exposure increases use via increased positive expectancies (Dal Cin et al., 2009; Willis, Sargent, Stoolmiller, Gibbons, & Gerrard, 2008). In other words, it is possible that ANTP and cigarette expectancies differ, and have differential relationships with ANTP and cigarette use, as a result of differential exposure to positive messages.

The current investigation sought to address the lack of knowledge about ANTP expectancies by examining relationships between e-cigarette and hookah expectancies and use over two weeks. We hypothesized that more positive ANTP expectancies would predict greater probability and frequency of ANTP use. We also examined whether these associations varied by expectancy type (i.e., health consequences, affect regulation, relief of cigarette craving, social facilitation). Because e-cigarette marketing and media often focus on use where cigarettes are prohibited (Kim et al., 2015), we hypothesized that expectancies related to ameliorating cigarette craving would be the strongest predictor of e-cigarette use. In contrast, because hookah is most often used in social settings (Kassem et al., 2015), we expected that social facilitation expectancies would best predict hookah use. Finally, we examined whether associations between ANTP use and expectancies were independent of cigarette expectancies. We anticipated that ANTP and cigarette expectancies would be correlated, but because of differences in product perceptions we hypothesized that ANTP expectancies' association with ANTP use would be independent of cigarette expectancies.

2. Materials and methods

2.1. Participants

Participants ($n = 377$, 58.0% male) were young adults ($M = 20.5$, $SD = 1.8$) recruited as part of a longitudinal study of nondaily cigarette smoking. In terms of race/ethnicity, 37.9% identified as Caucasian, 23.9% as Asian American, 19.6% as Hispanic or Latino, and 13.0% as multiracial. Eligibility criteria included being 18–24 years old, having smoked monthly for the previous six months, never having smoked daily for one month and being a California resident. Because assessments were completed online or via mobile phone app (Opinionmeter International, San Leandro, CA), participants were required to either own a smartphone or have regular internet access.

2.2. Procedure

Participants were recruited primarily via online advertisements. Interested individuals ($n = 4735$) completed a brief screening. Research staff e-mailed individualized links to those who were eligible ($n = 727$). Interested and eligible participants ($n = 377$) provided informed consent and completed the baseline assessment, for which they received a $25 gift card. Procedures were approved by the University of California, San Diego Institutional Review Board. Data were collected between March and October 2015.

2.3. Measures

2.3.1. Demographic and tobacco-related characteristics

Demographic variables included age, sex, race/ethnicity, student status, and education. Tobacco-related characteristics included intent to quit cigarettes in the next month and the next year, assessed on 5-point scales, with higher scores representing stronger intent. Due to small cell sizes, race was categorized as Caucasian ($n = 155$), Asian American ($n = 90$), Hispanic or Latino ($n = 96$), or other ($n = 36$).

2.3.2. Cigarette and ANTP use

ANTP and cigarette use for the past 14 days were assessed via Timeline Followback (Sobell & Sobell, 1992, 1996). For each product, days on which use occurred were indicated. The TLFB has strong validity and reliability with nondaily smokers (Harris et al., 2009) and has been validated for online use (Pedersen, Grow, Duncan, Neighbors, & Larimer, 2012; Ramo, Hall, & Prochaska, 2011).

2.3.3. Tobacco expectancies

ANTP expectancies were measured with eight items per product that were identical aside from the product name. Items were selected based on cigarette research (Hine et al., 2007; Myers et al., 2003) and included one question addressing health (to what extent do you believe